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CLAIMS

1. A purified protein having desaturase activity, and comprising an amino acid sequence selected from the group consisting of:
- (a) an amino acid sequence as shown in SEQ. ID NO. 4;
- (b) an amino acid sequence that differs from that specified in (a) by one or more conservative amino acid substitutions; and
- (c) an amino acid sequences having at least 60% sequence identity to the sequences specified in (a) or (b).
2. An isolated nucleic acid molecule encoding a protein according to claim 1.
3. The isolated nucleic acid molecule of claim 2, comprising a sequence as shown in SEQ ID NO: 2.
4. A recombinant nucleic acid molecule, comprising a control sequence operably linked to the nucleic acid sequence of claim 2.
5. A cell transformed with the recombinant nucleic acid molecule of claim 4.
6. A cell transformed with the recombinant nucleic acid molecule of claim 4 and a nucleic acid molecule selected from the group consisting of:
- (a) a nucleic acid molecule as shown in SEQ ID NO: 1; and
- (b) a nucleic acid molecule that has 60% sequence identity to the nucleic acid molecule shown in (a).
7. The cell of claim 5, wherein the cell is a plant cell.
8. An isolated nucleic acid molecule that:
- (a) hybridizes under low-stringency conditions with a nucleic acid probe, the probe comprising a sequence as shown in SEQ ID NO: 3, and fragments thereof; and
- (b) encodes a protein having desaturase activity.
9. A desaturase encoded by the nucleic acid molecule of claim 8.

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10. A recombinant nucleic acid molecule, comprising a promoter sequence operably linked to the nucleic acid molecule of claim 8.

11. A cell transformed with the recombinant nucleic acid molecule of claim 10.

12. A transgenic organism, comprising the transformed cell of claim 11, wherein the transgenic organism is selected from the group consisting of plants, bacteria, insects, fungi, and mammals.

13. A specific binding agent that binds to the desaturase of claim 9.

14. An isolated nucleic acid molecule that:

(a) has at least 60% sequence identity with a nucleic acid sequence as shown in SEQ ID NO: 3; and

(b) encodes a protein having desaturase activity.

15. A method of identifying a nucleic acid sequence, comprising:

(a) hybridizing the nucleic acid sequence to at least 10 contiguous nucleotides of a sequence as shown in SEQ ID NO: 3; and

(b) identifying the nucleic acid sequence as one that encodes a desaturase.

16. A nucleic acid molecule identified by the method of claim 15.

17. The method of claim 15, wherein hybridizing the nucleic acid sequence is performed under low-stringency conditions.

18. A desaturase encoded by the nucleic acid molecule of claim 15.

19. A specific binding agent, that binds the desaturase of claim 18.

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20. The method of claim 15, wherein step (a) occurs in a PCR reaction.
21. The method of claim 15, wherein step (a) occurs during a library screening.
22. A method for creating a double bond between two carbons in a fatty acid, comprising:
- contacting a fatty acid with at least one purified desaturase of claim 17; and
- allowing the desaturase to create a double-bond between two carbons.
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23. The method of claim 22, wherein the desaturase is expressed in a transgenic organism and the double-bond formation occurs *in vivo*.
24. The method of claim 23, wherein the desaturase is expressed in an organism selected from the group consisting of eukaryotes and prokaryotes.
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25. The method of claim 22, wherein the desaturase is expressed *in vitro* and the double-bond formation occurs *in vitro*.
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26. The method of claim 22, further comprising expressing a second desaturase.
27. The method of claim 26, wherein the second desaturase is selected from the group consisting of:
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- (a) an amino acid sequence as shown in SEQ. ID NO. 2;
- (b) an amino acid sequence that differs from those specified in (a) by one or more conservative amino acid substitutions; and
- (c) an amino acid sequences having at least 60% sequence identity to the sequences specified in (a) or (b).